

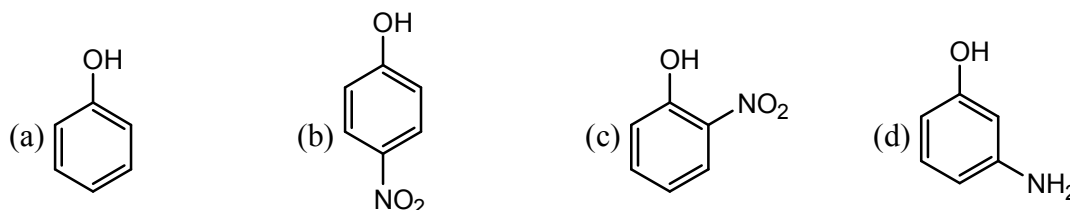
BHU M.Sc. Chemistry Entrance -2012

Instructions

- (1) Attempt as many questions as you can. Each question carries 3 marks. One mark will be deducted for each incorrect answer. Zero mark will be awarded for each unattempted question.
- (2) If more than one alternative answers seem to be approximate to the correct answer, choose the closest one.

1. Example of d^6 complex is
 (a) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$ (b) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ (c) $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ (d) $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$

2. Acidic strength is greater in



3. Cannizzaro reaction is not given by
 (a) formaldehyde (b) acetaldehyde (c) benzaldehyde (d) trimethylacetaldehyde

4. The equilibrium constant of a reaction $A + B \rightleftharpoons C + D$ at 327°C is 1×10^{-12} and at 527°C is 1×10^{-7} . The enthalpy of reaction is
 (a) $+54.84$ kcal/mole (b) -54.84 kcal/mole (c) 548.4 kcal/mole (d) 5.84 kcal/mole

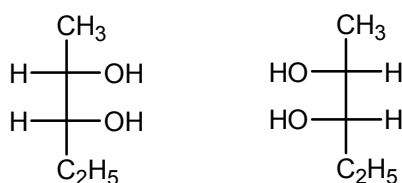
5. The wave mechanical model of atom depends on
 (a) de Broglie equation (b) Heisenberg uncertainty principle
 (c) Schrodinger wave equation (d) All of the above

6. In the cell $\text{Zn} | \text{ZnSO}_4 (1.0 \text{ M}) || \text{Fe}^{2+} (1.0 \text{ M}), \text{Fe}^{3+} (1.0 \text{ M}) | \text{Pt}$, given that $\text{Fe}^{3+}, \text{Fe}^{2+}, \text{Pt} = 0.769 \text{ V}$ and $\text{Zn}^{2+}, \text{Zn} = -0.76 \text{ V}$, the standard e.m.f. of the cell is
 (a) 0.76 V (b) -1.529 V (c) -0.769 V (d) 1.529 V

7. Ground term symbol for $\text{Mn}^{2+} (25)$ is
 (a) ${}^3\text{F}_2$ (b) ${}^2\text{D}_{3/2}$ (c) ${}^6\text{S}_{5/2}$ (d) ${}^5\text{D}_4$

8. Benzene reacts with methyl chloride in presence of anhydrous AlCl_3 to give toluene. This reaction is called
 (a) alkylation of benzene (b) Friedel-Crafts reaction
 (c) methylation reaction (d) All of the above

9. Following two compounds are

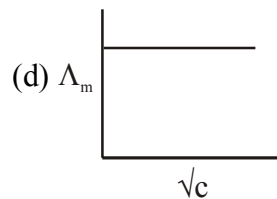
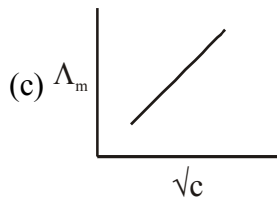
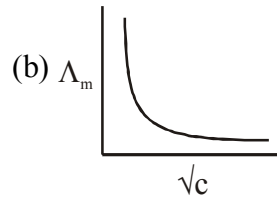
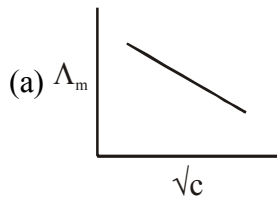


- (a) enantiomers (b) diastereomers (c) identical (d) epimers

10. Outer electronic configuration of lanthanides is

- (a) ns^{1-2} (b) $(n-1)d^{1-10}ns^2$
 (c) $(n-1)f^{1-14}ns^2$ (d) $(n-2)f^{1-14}(n-1)^{0-1}ns^2$

11. The variation of molar conductance of strong electrolyte with concentration is shown below



12. If α is the fraction of HI dissociated at equilibrium in the reaction



starting with 2 moles of HI, the total number of moles of reactants and products at equilibrium is

- (a) $2 + 2\alpha$ (b) 2 (c) $1 + \alpha$ (d) $2 - \alpha$

13. Density of 2.05 M solution of acetic acid in water is 1.02 g/ml. The molality of solution is

- (a) 3.28 mol/kg (b) 2.28 mol/kg (c) 3.24 mol/kg (d) 1.14 mol/kg

14. In a cubic crystal total elements of symmetry are

- (a) 9 (b) 13 (c) 1 (d) 23

15. Lattice energy of solids increases if

- (a) the radii of ions are small (b) the ions are neutral
 (c) charges on the ions are small (d) Madelung's constant decreases

16. If the value of radius ratio $\left(\frac{r^+}{r^-}\right)$ is 0.213, then coordination number of cation is

- (a) 2 (b) 4 (c) 3 (d) 6

17. Quantized rotational energy of molecule is given as

- (a) $v(r) = D_e \left[1 - \exp(\beta(r - r_e)) \right]^2$ (b) $\mu_s = -g \times e / 2m_e c \times \frac{h}{2\pi} \sqrt{S(S+1)}$
 (c) $\epsilon_J = J(J+1)h^2 / 8\pi^2 I$ (d) $v = \frac{\Delta E}{h} = \frac{\epsilon_{\text{upper}} - \epsilon_{\text{lower}}}{h}$

18. The observed chemical shift of a proton is 300 Hz from TMS and operative frequency of the spectrometer is 100 MHz. The chemical shift in term of δ (ppm) is

- (a) 1.5 (b) 4.5 (c) 3.0 (d) 6.0

19. The wave function (ψ) for hydrogen atom in terms of polar coordinates, is given by $\psi(r, \theta, \phi) = R(r)\Theta(\theta)\Phi(\phi)$. Which of the functions determines the shape of atomic orbitals?

- (a) $R(r)$ (b) $\Theta(\theta)$ (c) $\Phi(\phi)$ (d) None of these

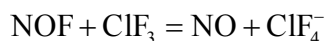
20. The energy can be represented in terms of partition functions by the following equation
- (a) $E = kT \left(\frac{\partial \ln \theta}{\partial T} \right)_v$ (b) $E = kT^2 \left(\frac{\partial \ln \theta}{\partial T} \right)_v$
- (c) $E = \frac{k}{T} \left(\frac{\partial \ln \theta}{\partial T} \right)_v$ (d) $E = \frac{k}{T^2} \left(\frac{\partial \ln \theta}{\partial T} \right)_v$
21. According to Bose-Einstein statistics the probability distribution is given by
- (a) $\frac{n_i}{g} = \frac{1}{e^{\alpha + \beta \epsilon_i}}$ (b) $\frac{n_i}{g} = \frac{1}{e^{\alpha + \beta \epsilon_i} - 1}$ (c) $\frac{n_i}{g} = \frac{1}{e^{\alpha + \beta \epsilon_i} + 1}$ (d) None of these
22. The half-life of radium is 1600 years. After how much time will 1 gm radium reduce to 125 mg ?
- (a) 1800 years (b) 1600 years (c) 3200 years (d) 4800 years
23. The vibrational degrees of freedom for (i) O_2 , (ii) N_2O , (iii) CH_2O , (iv) C_6H_6 , (v) $CHCl_3$ are respectively
- (a) 3, 1, 6, 6, 30 (b) 1, 3, 9, 30, 6 (c) 1, 3, 6, 30, 6 (d) 3, 6, 9, 6, 15
24. The shift of an absorption maximum towards longer wavelength is known as
- (a) bathochromic effect (b) bathochromic effect
- (c) hyperchromic effect (d) hypochromic effect
25. The actual value of nuclear spin depends on
- (a) mass number (b) atomic number (c) both (1) and (2) (d) shielding effect
26. The relationship between dihedral angle θ and vicinal coupling constant J_{HH} is given by Karplus equation which is
- (a) $J_{HH} = 8.5 \cos \phi - 0.50$ (b) $J_{HH} = 9.5 \cos \phi - 0.30$
- (c) $J_{HH} = 8.5 \cos^2 \phi - 0.28$ (d) $J_{HH} = 3.8 \cos \phi - 0.40$
27. Centrifugal forces due to rotation of molecule about any given axis tend to
- (a) increase the moment of inertia about the axis
- (b) decrease the effective rotational constant
- (c) both (a) and (b) (d) None of these
28. Which of the following is correct for photochemical reactions ?
- (a) Temperature has the same effect as on thermal reaction
- (b) Temperature has opposite effect as on thermal reaction
- (c) Temperature has no effect in the photochemical reaction
- (d) None of these
29. Chemisorption first increases and then decreases with increase in temperature because
- (a) $\Delta H = -ve$ (b) $\Delta S = -ve$ (c) ϵ_a is high (d) ϵ_a is low
30. The gold numbers of A, B, C and D are 0.04, 0.002, 10 and 25 respectively. The protective power of A, B, C and D are
- (a) $B > A > C > D$ (b) $A > B > C > D$ (c) $D > C > A > B$ (d) $B > A > D > C$
31. When KCl is heated in an atmosphere of K the violet colour appears which is due to
- (a) the electrons diffuse into the crystal and occupy the vacant sites created by Cl⁻ ions
- (b) the electrons diffuse into crystal and occupy the vacant sites
- (c) the K⁺ ions diffuse into the crystal and occupy the vacant sites created by Cl⁻ ions
- (d) None of these

32. For a simple cubic system the spacing of (100), (110) and (111) planes are in the ratio of
 (a) $1 : \frac{1}{\sqrt{2}} : \frac{1}{\sqrt{3}}$ (b) $\frac{1}{\sqrt{2}} : \frac{1}{\sqrt{3}} : 1$ (c) 1:1:1 (d) $\sqrt{3} : \sqrt{2} : 1$
33. Which of the following sets of quantum numbers is correct for an electron of 4f orbital?
 (a) $n = 4, l = 3, m = +4, s = +\frac{1}{2}$ (b) $n = 4, l = 4, m = -4, s = -\frac{1}{2}$
 (c) $n = 4, l = 3, m = +1, s = +\frac{1}{2}$ (d) $n = 3, l = 2, m = -2, s = +\frac{1}{2}$
34. The ionisation energy of hydrogen atom is 13.6 eV. What will be the ionisation energy of He^+ ?
 (a) 13.6 eV (b) 54.4 eV (c) 122.4 eV (d) zero
35. BaSO_4 is insoluble in water because
 (a) hydration energy is equal to lattice energy
 (b) hydration energy is more than lattice energy
 (c) lattice energy is more than hydration energy
 (d) BaSO_4 does not form hydrogen bonds with water molecules
36. Which of the following combination of atoms of A and B forms bonding molecular orbitals?
 (a) $(\psi_A - \psi_B)$ (b) $(\psi_A + \psi_B)$ (c) $(\psi_A \times \psi_B)$ (d) $\frac{\psi_A}{\psi_B}$
37. Which of the following processes involves increasing in bond order?
 (a) $\text{N}_2 \rightarrow \text{N}_2^+ + e^-$ (b) $\text{CO} + e^- \rightarrow \text{CO}^-$ (c) $\text{NO} \rightarrow \text{NO}^+ + e^-$ (d) $\text{O}_2 + e^- \rightarrow \text{O}_2^-$
38. In which salt are the anion cation iso-electronic?
 (a) LiF (b) NaCl (c) KCl (d) KBr
39. Oxygen may be prepared by heating potassium chlorate. What is the other product?
 (a) Potassium oxide (b) Potassium chloride
 (c) Potassium hypochlorite (d) Potassium chlorite
40. Radioactive decay of radon produces lead. What would be the other product / products?
 (a) Alpha particles (b) Neutrons
 (c) Neutrons and polonium (d) Alpha particles and polonium
41. From each pair given below identify the ion which is larger in size
 $[\text{Co}^{2+}, \text{Co}^{3+}]$ $[\text{Fe}^{2+}, \text{Zn}^{2+}]$ $[\text{Na}^+, \text{F}^-]$ $[\text{O}^{2-}, \text{S}^{2-}]$
 (a) $\text{Co}^{2+}, \text{Zn}^{2+}, \text{F}^-, \text{S}^{2-}$ (b) $\text{Co}^{3+}, \text{Fe}^{2+}, \text{Na}^+, \text{S}^{2-}$
 (c) $\text{Co}^{2+}, \text{Fe}^{2+}, \text{F}^-, \text{S}^{2-}$ (d) $\text{Co}^{3+}, \text{Zn}^{2+}, \text{Na}^+, \text{O}^{2-}$
42. Which one, among the given atoms, has the highest number of unpaired electrons in its ground state?
 (a) C (b) N (c) O (d) F
43. How many unpaired electrons are there in an atom of silver in its ground state?
 (a) 2 moles (b) 6 moles (c) $\frac{1}{3}$ mole (d) $\frac{1}{6}$ mole
44. How many moles of P_4O_{10} will react with one mole of water?
 (a) 2 moles (b) 6 moles (c) $\frac{1}{3}$ mole (d) $\frac{1}{6}$ mole

45. If 22 g of N_2O_5 reacts with 10 g of water to produce 22 g of nitric acid. What is the percentage yield of nitric acid ?
(a) 32 (b) 69 (c) 87 (d) 100
46. 10 ml of 0.10 N sodium hydroxide is added to 20 ml 0.10 N sulphuric acid and the resultant solution is titrated against 0.10 N sodium hydroxide. What will be the titre value at the end point ?
(a) 5 ml (b) 10 ml (c) 20 ml (d) 30 ml
47. An aqueous solution of a substance gives a white precipitate when a few drops of sodium hydroxide are added. The precipitate dissolves when excess of sodium hydroxide is added. The substance may be
(a) aluminium sulphate (b) silver nitrate
(c) cadmium chloride (d) mercuric chloride
48. When reagent may be used to precipitate barium from aqueous solutions ?
(a) Hydrochloric acid (b) Sulphuric acid
(c) Silver nitrate (d) Ammonium chloride
49. An element crystallizes in an FCC lattice. How many atoms are there per unit cell ?
(a) 1 (b) 2 (c) 3 (d) 4
50. A non-stoichiometric oxide of silver has composition $Ag_{1.8}O$. What percentage of Ag is present in the form Ag^{2+} ?
(a) 11 (b) 14 (c) 20 (d) 25
51. A sample of water contains 200 ppm of Ca^{2+} in it. What is the molality of the solution with respect to Ca ? (At mass of Ca = 40)
(a) 0.2 m (b) 2 m (c) 5×10^{-3} m (d) 0.05 m
52. What is the charge (n) on the silicate ion $Si_2O_7^n$?
(a) -2 (b) -4 (c) -6 (d) -7
53. Silver is extracted from the crude metal by leaching with a solution of NaCN in the presence of air. The role of NaCN is to
(a) oxidize Ag to Ag^+ (b) form the complex $[Ag(CN)_4]^{3-}$
(c) form the complex $[Ag(CN)_4]^{2-}$ (d) form the complex $[Ag(CN)_2]^-$
54. $CoCl_4^{2-}$ and $Co(H_2O)_6^{2+}$ have different colours. This is because
(a) they have Co in different oxidation states
(b) $CoCl_4^{2-}$ is tetrahedral while $Co(H_2O)_6^{2+}$ is octahedral
(c) they have different number of unpaired electrons
(d) $CoCl_4^{2-}$ is square planar while $Co(H_2O)_6^{2+}$ is octahedral
55. Dimethylglyoxime reagent is used to test for
(a) Ca^{2+} (b) Ni^{2+} (c) Fe^{3+} (d) Al^{3+}
56. Which molecule has zero bond order ?
(a) H_2^+ (b) H_2 (c) HeH (d) He_2
57. What is the bond order in NO molecule ?
(a) 2.5 (b) 2 (c) 1.5 (d) 1

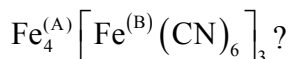
58. An AB_3 molecule with A as the central atom bonded to three B atoms may have the shape of an equilateral triangle or a triangular pyramid. Which one, among those given, is the most appropriate technique to distinguish between these two structures ?
(a) Measurement of dipole moment (b) Measurement of magnetic moment
(c) Measurement of viscosity (d) Measurement of boiling point
59. CuI_2 is unstable because, it readily decomposes to
(a) Cu and I^- (b) Cu and I_2 (c) CuI and I_2 (d) CuI and I^-
60. Which one among the chlorides $ZnCl_2$, $HgCl_2$, $BaCl_2$, $AlCl_3$, is dissociated to the least extent in aqueous solutions ?
(a) $ZnCl_2$ (b) $HgCl_2$ (c) $BaCl_2$ (d) $AlCl_3$
61. Which one, among the given ions, has the highest polarizing power ?
(a) Na^+ (b) Ca^{2+} (c) Mg^{2+} (d) Al^{3+}
62. Which compound can act as a Lewis acid as well as a Lewis base ?
(a) H_2O (b) $SnCl_2$ (c) NH_3 (d) BF_3
63. Perovskite is the mineral $CaTiO_3$. The Perovskite crystal structure is adopted by several oxides as well as some fluorides. Which one, among the given formulae; most likely represents a known fluoride having the perovskite structure ?
(a) $CaTiF_3$ (b) $KZnF_3$ (c) $CaTiF_5$ (d) $CaMgF_4$
64. CsF adopts the NaCl crystal structure. If the unit cell edge is of length 4.02 Å, what is the shortest distance between the cation and anion in the crystal ?
(a) 2.01 Å (b) 2.84 Å (c) 3.48 Å (d) 4.02 Å
65. The boron mineral, borax contains the anion, $[H_4B_4O_9]^{2-}$. What is the formal oxidation number of B in this anion ?
(a) 2.5 (b) 3 (c) 3.5 (d) 4
66. In its reaction with aqueous solutions of Cu^{2+} , the cyanide ion is similar to
(a) Co (b) Cl^- (c) I_2 (d) I^-
67. Which ligand can lead to linkage isomers ?
(a) Azide (b) Cyanate (c) Oxalate (d) Nitrate
68. If you were to prepare $[Cr(oxalate)_2(OH_2)_2]^-$ ion, how many isomers, including geometrical and optical, can you expect to get ?
(a) Only one (b) Two (c) Three (d) Four
69. Two isomers are obtained for $Pt(NH_3)_2Cl_2$. This is because
(a) the two complexes differ in the oxidation state of the metal
(b) the two complexes differ in the oxidation state of the metal as well as coordination number
(c) the two complexes differ in their coordination number
(d) the two complexes differ in their coordination number
70. Consider the following reaction
 $[Co(NH_3)_4Cl_2]^+ + H_2O \rightarrow [Co(NH_3)_4(H_2O)Cl]^{2+} + Cl^-$
The above reaction involves
(a) substitution (b) substitution and reduction
(c) oxidation (d) substitution and oxidation

71. Identify the acids in the following two reactions



- (a) ClF_3 and XeO_3 (b) ClF_3 and OH^- (c) NOF and OH^- (d) NOF and XeO_3

72. What are the formal oxidation states of the iron atoms labelled (A) and (B) in the compound



- (a) $\text{Fe}^{(A)}, 2+$ and $\text{Fe}^{(B)}, 3+$ (b) $\text{Fe}^{(A)}, 2+$ and $\text{Fe}^{(B)}, 4+$
 (c) $\text{Fe}^{(A)}, 3+$ and $\text{Fe}^{(B)}, 3+$ (d) $\text{Fe}^{(A)}, 3+$ and $\text{Fe}^{(B)}, 2+$

73. The magnetic moment of $\text{Co}(\text{H}_2\text{O})_6^{3+}$ is zero and that of $\text{Mn}(\text{CN})_6^{3-}$ is 2.9 BM. From this it may be concluded that

- (a) both ions are high spin
 (b) both ions are low spin
 (c) $\text{Co}(\text{H}_2\text{O})_6^{3+}$ is low spin, $\text{Mn}(\text{CN})_6^{3-}$ is high spin
 (d) $\text{Co}(\text{H}_2\text{O})_6^{3+}$ is diamagnetic, $\text{Mn}(\text{CN})_6^{3-}$ is high spin

74. Which among the following compounds/ions are diamagnetic ?



- (a) CoCl_4^{2-} and PdCl_4^{2-} (b) CuCl_6^{4-} , $\text{Cu}(\text{SCN})$ and $\text{Ni}(\text{CO})_4$
 (c) $\text{Cu}(\text{SCN})$ and $\text{Ni}(\text{CO})_4$ (d) $\text{Cu}(\text{SCN})$, $\text{Ni}(\text{CO})_4$ and PdCl_4^{2-}

75. Which one is an example of a 'sandwich' compound ?

- (a) $\text{Cr}(\text{C}_6\text{H}_6)_2$ (b) $\text{Cr}(\text{CO})_6$
 (c) $\text{Cr}_2(\text{CH}_3\text{COO})_2$ (d) $[\text{Pt}(\text{NH}_3)_2][\text{PtCl}_4]$

76. Adsorption chromatography is also known as

- (a) liquid-liquid chromatography (b) liquid-gas chromatography
 (c) liquid-solid chromatography (d) paper chromatography

77. Planar chromatographic method includes

- (A) high-performance liquid chromatography (B) thin-layer chromatography
 (C) paper chromatography (D) electrochromatography
 (a) only A (b) both A and B (c) B, C and D (d) A, B and C

78. The plate count in column chromatography is given by

$$(a) N = 16 \left(\frac{t_R}{W} \right)^2 \quad (b) \frac{N}{16} = \left(\frac{t_R}{W} \right) \quad (c) N = 160 \left(\frac{t_R^2}{W} \right) \quad (d) \frac{N}{16} = \frac{W^2}{t_R}$$

79. Twenty millilitres of an aqueous solution of 0.10 M butyric acid is shaken with 10 mL ether. After the layers are separated, it is determined by titration that 0.5 mmol butyric acid remains in the aqueous layer. The distribution

- (a) 0.6 (b) 6.0 (c) 0.06 (d) 6.5

80. In countercurrent distribution, the fraction, $F_{r,n}$, of solute contained in the r th tube after n transfers using equal volumes of the two solvents is given by

$$(a) F_{r,n} = \frac{\angle n}{\angle r \angle (n-r)} \left(\frac{1}{D+1} \right)^n D^r \quad (b) F_{r,n} = \frac{\angle r}{\angle n \angle (n-r)} \left(\frac{1}{D+1} \right)^n D^r$$

$$(c) F_{r,n} = \frac{\angle n \angle r}{\angle (n-r)} \left(\frac{1}{D+1} \right)^n D^r \quad (d) F_{r,n} = \frac{\angle n}{\angle r \angle (n-r)} \left(\frac{D+1}{D} \right)^n D^r$$

81. Which one is semi-microanalysis ?

- (a) > 0.1 g (b) 0.01 to 0.10 g (c) 0.001 to 0.01 g (d) $< 10^{-4}$ g

82. Which one is trace analyte level ?

- (a) 1% to 100% (b) 0.01% to 1.0% (c) 1 ppb to 100 ppm (d) < 1 ppb

83. ppb amount is

- (a) $\frac{g}{L}$ (b) $\frac{\mu g}{L}$ (c) $\frac{mg}{L}$ (d) $\frac{ng}{L}$

84. The result $\text{antilog } 12.5 = 3.162277 \times 10^{12}$ can be represented better by retaining significant digits as

- (a) $\text{antilog } 12.5 = 3 \times 10^{12}$ (b) $\text{antilog } 12.5 = 3.2 \times 10^{12}$
 (c) $\text{antilog } 12.5 = 3.1 \times 10^{12}$ (d) $\text{antilog } 12.5 = 3.162 \times 10^{12}$

85. The equation for the normal error curve is

$$(a) y = \frac{e^{-z^2/2}}{\sigma\sqrt{2\pi}} \quad (b) y = \frac{e^{-z^2/2} \cdot \sigma}{\sqrt{2\pi}} \quad (c) y = \frac{e^{z^2/2}}{\sigma\sqrt{2\pi}} \quad (d) y = \frac{e^{-z^2/2} \cdot \sqrt{2\pi}}{\sigma}$$

86. The coefficient of variation is

- (a) % relative standard deviation (b) relative standard deviation
 (c) standard deviation (d) square of the standard deviation

87. The analysis of a calcite sample yielded CaO percentage of 55.95, 56.00, 56.04, 56.08 and 56.23. The last value appears anomalous and rejection quotient at 95% confidence level is 0.71. Should the last value be rejected or retained at 95% confidence level ?

- (a) Retained (b) Rejected (c) All are acceptable (d) Cannot say

88. Standard EDTA [H_4Y] solution is ordinarily prepared by dissolving weighed amount of

- (a) $Na_2H_2Y \cdot 2H_2O$ (b) Na_2H_2Y (c) NaH_3Y (d) Na_3HY

89. Which is the optimum velocity according to van Deemter plot ?

$$(a) U_{opt} = \sqrt{\frac{B}{C}} \quad (b) U_{opt} = \sqrt{\frac{AB}{C}} \quad (c) U_{opt} = \frac{B}{\sqrt{C}} \quad (d) U_{opt} = \frac{\sqrt{B}}{C}$$

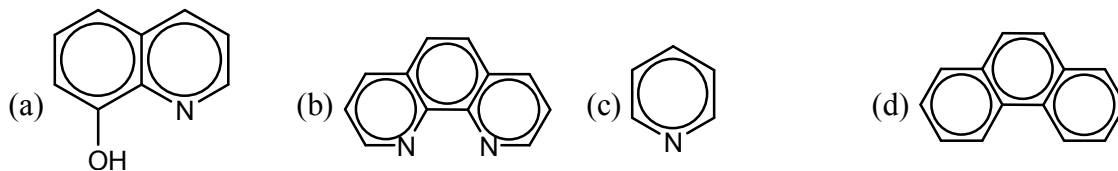
90. Quadrivalent cerium is widely used in redox titration because

- (a) it is cheaper (b) it can be easily prepared
 (c) its aqueous solution is highly stable (d) its aqueous solution can be standardized easily

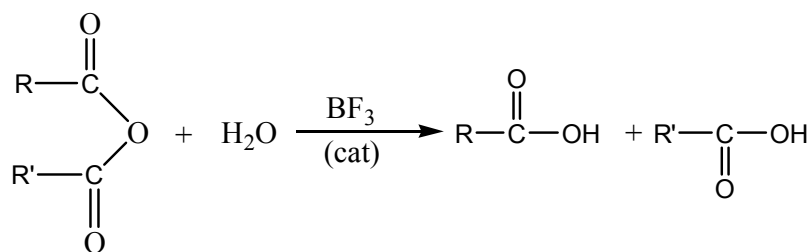
91. If you do not have eriochrome black-T indicator for the complexometric titration of a metal, which following option is left with you ?

- (a) Able to perform titration without indicator (b) Able to perform titration using phenolphthalein
 (c) Wait until eriochrome black-T is procured (d) Cannot be able to perform titration

92. Eriochrome black-T can be used in EDTA titration at pH 7 because
 (a) end point is indicated by a contrast colour change
 (b) it is stable at this pH
 (c) EDTA is stable at this pH
 (d) buffer of pH7 can easily be prepared
93. Ferroin is ferrous complex of

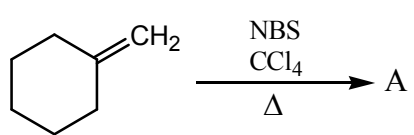
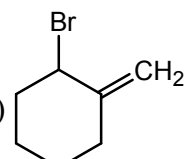
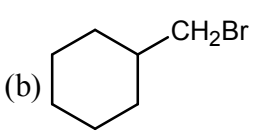
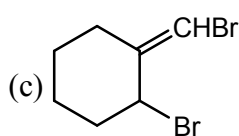


94. Mg^{2+} can be precipitated by oxine using metal:oxine ratio
 (a) 1:4 (b) 1:2 (c) 1:1 (d) 2:1
95. Von Weimarn ratio depicts the relative supersaturation (Q') of solution during the precipitation process in terms of the degree of supersaturation (Q) and solution (S) of precipitate in the manner $Q' = \frac{Q-S}{S}$. The favourable condition for the precipitation is
 (a) keep Q low and S high (b) keep Q high and S low
 (c) keep Q and S both low (d) keep Q and S both high
96. Phenol can be quantitatively determined by
 (a) complexation reaction (b) precipitation titration
 (c) bromate-bromide reaction (d) gravimetric estimation
97. How many moles of Br_2 are generated if 3 moles of $KBrO_3$ are reacted with 15 moles of KBr ?
 (a) 6 (b) 9 (c) 15 (d) 1
98. Select the procedure which you recommend for the quantification of organic compound(s) involved in the following reaction

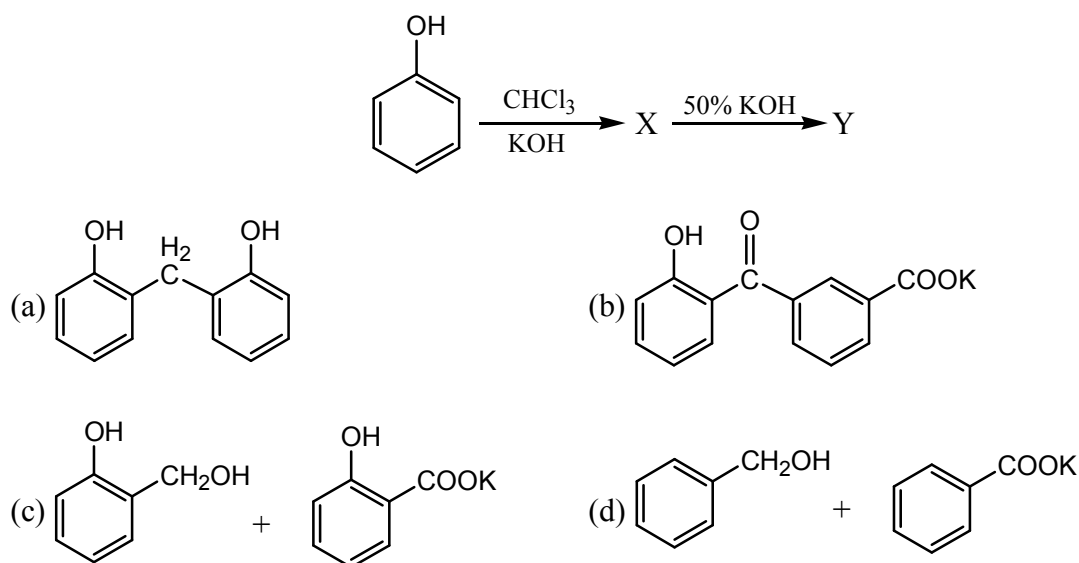


- (a) Malaprade oxidation (b) Karl Fisher titration
 (c) Cerate titration (d) Bromate oxidation
99. The best photometric accuracy can be had within the following range of transmittance (T)
 (a) 20-80% T (b) 30-90% T (c) 15-65% T (d) 65-100% T
100. Aqueous solution of potassium chromate offer a typical example of an apparent deviation from Beer's law which may be attributed to unsymmetrical chemical equilibria

$$2\text{CrO}_4^{-2} + 2\text{H}^+ \rightleftharpoons 2\text{HCrO}_4^- \rightleftharpoons \text{Cr}_2\text{O}_7^{-2} + \text{H}_2\text{O}$$
 Predict the condition under which the Beer's law can be obeyed
 (a) Dilute the potassium chromate solution
 (b) Make the strongly alkaline solution of potassium chromate
 (c) Make the moderately alkaline solution of potassium chromate
 (d) Make the neutralized solution (pH7.0) of potassium chromate

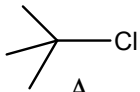
101. Potassium bromate in basic solution exhibits an absorption maximum of 372 nm. A basic solution containing 3.00×10^{-5} M KBrO_3 transmits 10% of the incident radiation at 372 nm when it placed in a 1.0 cm cell. The absorbance of the solution is
 (a) 0 (b) 1 (c) 2 (d) 3
102. The pH at the end point for the titration of weak acid is
 (a) 7 (b) > 7 (c) < 7 (d) 0
103. The pH of 10^{-2} M NaOH solution is
 (a) 2 (b) 12 (c) 5 (d) 9
104. In the potentiometric titration of Fe^{+2} with Ce^{+4} , the equivalence point potential can be computed as
 (a) $E = E_{\text{Fe}}^{\circ} + E_{\text{Ce}}^{\circ}$ (b) $E = \frac{E_{\text{Fe}}^{\circ} + E_{\text{Ce}}^{\circ}}{2}$ (c) $E = \frac{E_{\text{Fe}}^{\circ} - E_{\text{Ce}}^{\circ}}{2}$ (d) $E = E_{\text{Fe}}^{\circ} - E_{\text{Ce}}^{\circ}$
105. Chloramine-T acts as if it
 (a) a metallochromic-indicator (b) a pH-indicator
 (c) a highly reactive sodium hypochlorite (d) a redox-indicator
106. The molar absorptivity has the unit
 (a) L mol cm^{-1} (b) $\text{L}^{-1} \text{ mol}^{-1} \text{ cm}$ (c) $\text{L mol}^{-1} \text{ cm}^{-1}$ (d) No unit
107. In the isotropic dilution method
 (a) known weight of isotropically labelled species is mixed with the sample
 (b) any amount of isotropically labelled species is mixed with the sample
 (c) half of the sample amount is mixed with the isotropically labelled species
 (d) dilution is necessary with water
108. Which one is pertinent receptor of photochemical smog?
 (a) Ocean (b) Plant (c) Soil (d) Man
109. Which one is sink of CO_2 ?
 (a) Soil (b) Ocean (c) Plant (d) Air
110. Which one is contaminant?
 (a) CO (b) Mercury (c) SO_2 (d) Chlorine
112. What happens when there is rise in CO_2 emission in the air?
 (a) Global warming (b) Global cooling (c) Storm (d) Acid rain
113. The major organic product in the following reaction is

 (a)  (b)  (c)  (d) None of these
114. An $\text{S}_{\text{N}}2$ reaction at an asymmetric carbon atom of a dextro alkyl halide always gives a
 (a) laevo product (b) racemic mixture
 (c) single optically active isomer (d) dextro product

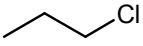
115. Aqueous solution of phenol is known as
 (a) benzoic acid (b) carboic acid (c) phenoxide (d) None of these
116. What happens when 1-naphthalenesulphonic acid is heated in sulphuric acid at 160°C ?
 (a) Naphthalenesulphonic acid is obtained in major amount
 (b) A mixture of 2-naphthalenesulphonic acid and naphthalene-1, 2-disulphonic acid is obtained
 (c) Naphthalene-1, 2-disulphonic acid is obtained in major amount
 (d) 1-Naphthalenesulphonic acid is recovered
117. Clemmenson's reduction will convert cyclohexanone into
 (a) cyclohexanoic acid (b) cyclohexane (c) n-hexane (d) benzene
118. The final product(s) of the following reaction is/are

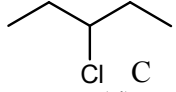

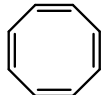



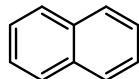
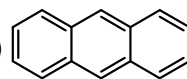
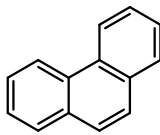


119. Which of the following does not reduce Tollens' reagent ?
 (a) CH_3CHO (b) HCOOH (c) $\text{C}_6\text{H}_5\text{NHOH}$ (d) $\text{C}_6\text{H}_5\text{NH}_2$
120. Reaction of ethyne with HCN in presence of $\text{Ba}(\text{CN})_2$ is an example of
 (a) electrophilic addition (b) nucleophilic addition
 (c) free radical addition (d) electrophilic substitution
121. An alkene on ozonolysis gives two moles of glyoxal and two moles of methanal. The molecular formula of alkene is
 (a) C_6H_8 (b) C_8H_{12} (c) C_8H_{14} (d) C_7H_{10}
122. Out of the following name reactions which gives unsymmetrical alkane ?
 (a) Wurtz reaction (b) Corey-House reaction
 (c) Decarboxylation reaction (d) Frankland reaction
123. Consider the following carbocations
 (a) $\text{C}_6\text{H}_5\text{CH}_2^+$ (b) $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_2^+$ (c) $\text{C}_6\text{H}_5\text{CH}^+\text{CH}_3$ (d) $\text{C}_6\text{H}_5\text{C}^+(\text{CH}_3)_2$
- The correct sequence for the stability of these is
 (a) A, B, C, D (b) B, C, A, D (c) D, C, A, B (d) D, C, B, A
124. Hypsochromic effect is also known as
 (a) red shift (b) blue shift (c) bathochromic shift (d) None of these

125. Fenton's reagent is used in
(a) mutarotation (b) Killiani-Fischer synthesis
(c) Ruff degradation (d) Wohl degradation
126. When 2-chloro-2-methylbutane is refluxed with alcoholic KOH, the main product obtained is
(a) $(\text{CH}_3)_2\text{C}=\text{CHCH}_3$ (b) $(\text{CH}_3)_2\text{C}(\text{OH})\text{CH}_2\text{CH}_3$
(c) $\text{CH}_2=\text{C}(\text{CH}_3)\text{CH}_2\text{CH}_3$ (d) $(\text{CH}_3)_3\text{CCH}_2\text{OH}$
127. Which of the following is a polyamide molecule ?
(a) Terylene (b) Rayon (c) Polystyrene (d) Nylon 6
128. Which one of the following pairs can be distinguished by Fehling solution ?
(a) Glucose and Fructose (b) Glucose and Mannose
(c) Fructose and Sucrose (d) Maltose and Glucose
129. Piperine on hydrolysis with KOH gives
(a) piperidine and piperic acid and this shows the presence of an amide group
(b) piperidine and piperic acid and this shows the presence of an ester group
(c) pyridine and piperic acid and this shows the presence of an amide group
(d) pyridine and piperic acid and this shows the presence of an ester group
130. Which of the following statements is correct ?
(a) Citral-a is also known as geranial and exists in Z form
(b) Citral-a is also known as geranial and exists in E form
(c) Citral-b is also known as neral and exists in E form
(d) Citral-a and citral-b represent the same compound
131. Which of the following rearrangements involves nitrene as intermediate ?
(a) Beckmann (b) Hofmann (c) Baeyer-Villiger (d) Pinacol-pinacolone
132. Preferred conformations of cyclohexane and methylcyclohexane, respectively are
(a) chair and chair with equatorial methyl (b) chair and chair with axial methyl
(c) boat and chair with equatorial methyl (d) boat and boat with equatorial methyl
133. Propiophenone on reaction with phenylhydrazine followed by treatment with ZnCl_2 gives
(a) 2-propylindole (b) 2-propionylindole (c) 2-ethylindole (d) 2-methylindole
134. The correct order of migratory aptitude of the groups in Baeyer-Villiger oxidation is
(a) phenyl > p-chlorophenyl > p-methoxyphenyl > p-hydroxyphenyl
(b) p-chlorophenyl > p-methoxyphenyl > p-hydroxyphenyl > phenyl
(c) p-methoxyphenyl > p-hydroxyphenyl > phenyl > p-chlorophenyl
(d) p-hydroxyphenyl > phenyl > p-methoxyphenyl > p-chlorophenyl
135. An aqueous solution of D-glucose in equilibrium contains
(a) α - and β -anomers in equal amounts (b) α - anomer in major amount and β -anomer in minor amount
(c) α - anomer in minor amount and β -anomer in major amount
(d) α -and β -anomers in variable amounts
136. The Chichibabin reaction of pyridine gives
(a) 2-aminopyridine in good yield along with trace amount of 4-aminopyridine
(b) 2-aminopyridine in good yield along with trace amount of 3-aminopyridine
(c) 4-aminopyridine in good yield along with trace amount of 2-aminopyridine (d) only 4-aminopyridine
137. Bakelite is obtained from phenol by the reacting with
(a) HCHO (b) CH_3OH (c) CH_3CHO (d) CH_3COCH_3

138. Which synthesis can be applied for quinoline ?
 (a) The Skraup synthesis only (c) The Bischler-Nepieralski and Skraup synthesis
 (c) The Pomeranz-Fritsch synthesis only (d) The Skraup and Friedlander synthesis
139. Hofmann's exhaustive methylation of piperidine gives
 (a) 1, 4-pentadiene (b) 1, 3-pentadiene (c) 1, 3-butadiene (d) 1, 3-cyclopentadiene
140. Which of the following is an auxochrome ?
 (a) C=C (b) -CO- (c) -C₆H₅ (d) -NH₂
141. Isoelectric point is the point, where concentration of dipolar ion is
 (a) minimum (b) maximum (c) intermediate (d) Can be of any value
142. Plexiglass is a commercial name of
 (a) polyacrylonitrile (b) glyptal
 (c) polymethylmethacryl (d) polyethylmethacryl
143. Which amine will be used as starting material in the Pictet-Spengler sythesis of isoquinoline ?
 (a) Benzylamine (b) Aniline (c) 2-Phenylethylamine (d) 2-Propylamine
144. What will be the effect on the rate of S_N2 type reaction if the concentration of MeI is doubled and that of OH⁻ is halved ?
 (a) The rate becomes 2 times faster (b) The rate becomes 4 time faster
 (c) The rate becomes half (d) No change in the rate
145. Using given codes, arrange the following compounds in decreasing order of the rate of solvolysis by S_N1 mechanism
- 
A


B


C
- (a) A > C > B (b) C > B > A (c) A > B > C (d) B > A > C
146. 1, 3-Dichloropropane on reaction with Zn and NaI gives
 (a) propane (b) 1-chloropropane (c) cyclohexane (d) cyclopropane
147. Which one of the following is aromatic ?
 (a)  (b)  (c)  (d) 
148. Which of the following compounds is most stable ?
 (a)  (b)  (c)  (d) 
149. A nonapeptide undergoes partial hydrolysis to give peptides whose amino acid compositions are shown (A-H). Reaction of intact nonapeptide with Edman's reagent releases PTH-Leu. What is the sequence of the nonapeptide?
 (A) Pro, Ser (B) Gly, Glu (c) Met, Ala, Leu (d) Gly, Ala
 (E) Glu, Ser, Val, Pro (F) Glu, Pro, Gly
 (G) Met, Leu (H) His, Val
 (a) Leu-Met-Ala-Gly-Glu-Pro-Ser-Val-His (b) Leu-Ala-Met-Gly-Glu-Pro-Ser-Val-His
 (c) Leu-Met-Ala-Glu-Gly-Pro-Ser-Val-His (d) Leu-Met-Ala-Gly-Glu-Pro-Ser-His-Val
150. Which is least aromatic ?
 (a) Pyrrole (b) Furan (c) Thiophene (d) Benzene